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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/929,896	08/15/2001	Seong Woo Suh	YAFO-10	9254

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1215 Tottenham Court
Reston, VA 20194

EXAMINER
SEVER, ANDREW T

ART UNIT	PAPER NUMBER
2851	

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/929,896	SUH ET AL.	
	Examiner	Art Unit	
	Andrew T Sever	2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,23-32,37-46,48,50-58,60,61 and 63-68* is/are rejected.

7)☒ Claim(s) *17-22,24, 33-36,38, 47,49,51-60 and 62* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 January 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to because Figure 11 and figure 18 are missing in the formal drawings received on Jan. 16, 2002. **A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.**

For purposes of examination, the examiner will utilize the informal drawing submitted on 08/15/2001 for figures 11 and 18.

2. The drawings are objected to because the bottom of page 8 discusses figures 3 and 4, however it appears it should be discussing figures 6a and 7. **A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.**

The bottom of page 8 continued on page 9 states that the figures show a device where the center electrode is grounded, clearly in figure 3 no device is shown and figure 4 does not show grounding either. Since the next line on page 9 states "as shown in figure 6", the examiner assumes that the applicant meant on page 8 to be discussing figures 6a and 7.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: central electrode 205 in figure 11 as called for on page 27 of the specification. **A proposed drawing correction or**

corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 270 in figure 11 (see above). **A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.**

Specification

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

6. Claims 51-60 are objected to because of the following informalities: the last line states that the generator is programmed, the examiner believes this should be the controller is programmed. Appropriate correction is required.

Claims 52-60 are objected to due to their dependency on claim 51.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 23, 24, 37, 38, 48, and 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not teach varying the dithering of the first angular rotation at a different frequency from that of the first retardation.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1-5, 25-28, 39-42, and 50 are rejected under 35 U.S.C. 102(e) as being anticipated by Bismuth et al. (US 6,188,809.)

Bismuth teaches in column 2 through column 3:

A method for transforming the state of polarization of an electromagnetic wave using a hybrid polarization transformer comprising at least one section capable of supplying a first retardation and a first angular rotation, said method comprising:

varying said first retardation (lines 10-14); and

varying said first angular rotation. (lines 8-10).

Also see column 6 line 56 through column 7 line 5.

With regards to applicant's claims 2 and 3:

Bismuth teaches both the situation where the varying of the first retardation and the first angular rotation are performed substantially simultaneously (column 5 lines 44-49 states both V_0 and θ are varied in a continuous fashion, elsewhere in column 6 lines 61-63 Bismuth teaches that V_0 changes the retardance while θ controls the angle.) and where the varying of the first retardation and the first angular rotation are performed alternatingly (see column 7 lines 4 and 5 which states that during a reset operation retardance can be maintained at 2π while the angle is varied).

With regards to applicant's claims 4 and 5:

Bismuth further teaches in column 6 lines 8-40 that the controller can when appropriate use a method of varying the first retardation is performed while the first angular rotation is substantially fixed and wherein the varying the first angular rotation is performed while the first retardation is substantially fixed. (Movement along the x-axis in figure 12 is changing the retardation while a change in the angle is changing the angular rotation.)

With regards to applicant's claims 25-30, 39-42, and 50:

Bismuth teaches in figure 11 that the polarization controller optics are controlled by a controller 114 which inherently contains a memory containing a computer program of instructions for operating the above methods. With respect to claims 26-28 and 40-42, see the rejection with respect to claims 2-5 above. With regards to claim 50, Bismuth teaches an example in column 6 line 64 to column 7 line 5 where the minimum retardation equals to a wave of retardation another example is taught in column 6 lines 8-40.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 6-16, 23, 29-32, 37, 43-46, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bismuth et al. (US 6,188,809) as applied to claims 1-5, 25-28, 39-42, and 50 above, and further in view of Heismann (US 5,212,743)

Bismuth as explained in more detail above teaches a method for transforming the state of a polarization of an electromagnetic wave using a hybrid polarization transformer comprising varying the first retardation and varying the first angular rotation. Bismuth also inherently teaches a memory for operating a computer program, which executes the method in a hybrid polarization transformer. Bismuth, while incorporating Heismann by reference, does not

specifically by itself teach measuring feedback values and adjusting the retardation and angular rotation accordingly.

Heismann, which is incorporated by reference into Bismuth, teaches an automatic polarization controller, which controls a polarization transformer that varies retardation as well as angular rotation. Heismann teaches in column 9 line19 through column 10 line 19 the method by which the controller which is common to both Heismann and Bismuth controls both the angular rotation and the retardation.

First with regards to the angular rotation and applicant's claims 6, 7, 13, 14, 43, and 45 Heismann teaches measuring a first feedback value, dithering the first angle rotation by an angular rotation dither step, then measuring a second feedback value and then based on the first and second feedback values as well as the angle rotation dither step performing a gradient calculation, which is used for calculating a new angular rotation (One with ordinary skill in the art would recognize that this would be the only obvious means of calculating the gradient). The first angular rotation is then set to the new angular rotation. With regards to applicant's claims 13, 14, and 45 inherently and obviously if dithering in the positive direction results in negative feedback (the feedback from the photo diode to the controller is the opposite of the desired result), the one with ordinary skill in the art would obviously design the method/algorithm to have the sign parameter reversed so that that the angular rotation would be dithered in the opposite SIGN direction.

With regards to claims 8, 9, 11, 12, 15, 16, 44, and 46, Heismann does not specifically teach this method for varying the first retardation, however it would have been obvious to one with ordinary skill in the art at the time the invention was made when using the polarization

transformer taught by Bismuth with an optical source that randomly varies (see Bismuth column 5 lines 42-45) to use the method for varying the angle of rotation as taught by Heismann for also varying the first retardation. With regards to applicant's claims 15, 16, and 46 inherently and obviously if dithering in the positive direction results in negative feedback (the feedback from the photo diode to the controller is the opposite of the desired result), the one with ordinary skill in the art would obviously design the method/algorithm to have the sign parameter reversed so that that the retardation would be dithered in the opposite SIGN direction.

With regards to applicant's claim 9, both Heismann and Bismuth teach examples of varying both the retardation and angle of rotation to maintain a maximum retardation value of 2π (see column 6 lines 1-40).

With regards to applicant's claim 29-32, Bismuth teaches in figure 11 that the polarization controller optics are controlled by a controller 114 which inherently contains a memory containing a computer program of instructions for operating the above methods.

With regards to applicant's claims 23, 37, and 48 as nearly as can be understood, one with ordinary skill in the art at the time the invention was made would assume that since Bismuth has the ability to vary the dithering of the first retardation at a different time then the first angular rotation (or not vary one at all depending on the situation.), that obviously the controller of Bismuth in view of Heismann has in its memory a program which includes the method of varying the first retardation's dithering at a first frequency and the first angular rotation at a second (for example the examiner assumes this to mean that the program varies the angular rotation more often then the retardation.)

13. Claims 51-54, 61, and 63-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bismuth et al. (US 6,188,809) as applied to claims 1-5, 25-28, 39-42, and 50 above, and further in view of Wooten (US 6,493,473.)

Bismuth as explained in more detail above teaches a method for transforming the state of a polarization of an electromagnetic wave using a hybrid polarization transformer comprising varying the first retardation and varying the first angular rotation. Bismuth also inherently teaches a memory for operating a computer program, which executes said method in a hybrid polarization transformer. Bismuth, however, only teaches the hybrid polarization transformer and its controller, Bismuth does not specifically teach other components used in connection with a polarization mode dispersion compensator such as a PMD generator and an optically distortion analyzer.

Wooten teaches in figure 1, a polarization mode dispersion compensator, which comprises a polarization transformer having an input for receiving an optical beam and an output for providing a polarization transformed beam (40A and B.) A PMD generator in optical alignment with the transformer is taught for one line (62). An optical distortion analyzer for receiving a portion of the transformed beam and providing signal that is indicative of quality of the transformed beam is provided (SOP element 132) for providing feedback to the transformer controller which controls the transformer based on the quality of the beam. Wooten teaches in column 4 lines 19-34 that the PMD generator is useful for compensating for PMD, while the other components (specifically the optical distortion analyzer) are well known components for the purpose of providing feedback to the controller of the polarization transformer and therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made

to include a PMD generator, an optical distortion analyzer and a transformer controller in Bismuth's method and device for controlling the polarization of a beam of light.

With regards to applicant's claims 52-54 see the rejection of claims 2-4 respectively.

With regards to applicant's claims 61 and 63-68, Wooten shows in figure 1, that two signals are sent from the sensor (64) to the optical distortion analyzer (132), obviously either an optical or electronic demultiplexer of some sort could be used for this effect, given that photo-diodes which make up the sensors are expensive and lead to signal loss, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use one sensor and a demultiplexer coupled to it to split the single signal into a plurality of signals. With regards to applicant's claims 63-68 see the rejection to claims 2-5.

14. Claims 55-58 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bismuth in view of Wooten as applied to claims 51-54 above, and further in view of Heismann (US 5,212,743.)

Bismuth in view of Wooten as explained in more detail above teaches a method for transforming the state of a polarization of an electromagnetic wave using a hybrid polarization transformer comprising varying the first retardation and varying the first angular rotation. Bismuth also inherently teaches a memory for operating a computer program, which executes said method in a hybrid polarization transformer. Bismuth in view of Wooten further teaches,

other components used in connection with a polarization mode dispersion compensator such as a PMD generator and an optically distortion analyzer. Bismuth in view of Wooten, while incorporating Heismann by reference, does not specifically by itself teach measuring feedback values and adjusting the retardation and angular rotation accordingly.

Heismann, which is incorporated by reference into Bismuth, teaches an automatic polarization controller, which controls a polarization transformer that varies retardation as well as angular rotation. Heismann teaches in column 9 line19 through column 10 line 19 the method by which the controller which is common to both Heismann and Bismuth controls both the angular rotation and the retardation.

First with regards to the angular rotation and applicant's claims 55 and 57, Heismann teaches measuring a first feedback value, dithering the first angle rotation by an angular rotation dither step, then measuring a second feedback value and then based on the first and second feedback values as well as the angle rotation dither step performing a gradient calculation, which is used for calculating a new angular rotation (One with ordinary skill in the art would recognize that this would be the only obvious means of calculating the gradient). The first angular rotation is then set to the new angular rotation. With regards to applicant's claim 57 inherently and obviously if dithering in the positive direction results in negative feedback (the feedback from the photo diode to the controller is the opposite of the desired result), the one with ordinary skill in the art would obviously design the method/algorithm to have the sign parameter reversed so that that the angular rotation would be dithered in the opposite SIGN direction.

With regards to claims 56 and 58, Heismann does not specifically teach this method for varying the first retardation, however it would have been obvious to one with ordinary skill in

the art at the time the invention was made when using the polarization transformer taught by Bismuth with an optical source that randomly varies (see Bismuth column 5 lines 42-45) to use the method for varying the angle of rotation as taught by Heismann for also varying the first retardation. With regards to applicant's claim 58 inherently and obviously if dithering in the positive direction results in negative feedback (the feedback from the photo diode to the controller is the opposite of the desired result), the one with ordinary skill in the art would obviously design the method/algorithm to have the sign parameter reversed so that that the retardation would be dithered in the opposite SIGN direction.

With regards to applicant's claim 60 as nearly as can be understood, one with ordinary skill in the art at the time the invention was made would assume that since Bismuth in view of Wooten has the ability to vary the dithering of the first retardation at a different time then the first angular rotation (or not vary one at all depending on the situation.), that obviously the controller of Bismuth in view of Wooten further in view of Heismann has in its memory a program which includes the method of varying the first retardation's dithering at a first frequency and the first angular rotation at a second (for example the examiner assumes this to mean that the program varies the angular rotation more often then the retardation.)

Allowable Subject Matter

15. Claims 17-22, 24, 33-36, 38, 47, 49, 59, and 62 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. The following is a statement of reasons for the indication of allowable subject matter:

Claims 17-22, 24, 33-36, 38, 47, 49, 59, and 62 claim that the polarization transformer comprises of more then one section, both section which can independently be operated (the retardation and angular rotation of each section can be changed separately by the controller.) The polarization transformer taught by Bismuth et al. is clearly made up of one long section, however many of the prior art patents such as the Heismann and Wooten patents teach multiple segmented polarization transformers. The prior art multiple segmented polarization transformers, however, unlike the Bismuth transformer are segmented in order to obtain the flexibility of the single segment of the Bismuth patent; the segments are not separately operable and can not by themselves offer a full range of retardation and angular rotation values, unlike the Bismuth patent and the present invention. Since the Bismuth patent does not teach using multiple segments nor does it teach using a second polarization transformer as a PMD generator, these claims would be allowable if re-written in independent form including the subject matter of their dependent base claims.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6,556,732 to Chowdhury et al. teaches multiple segmented polarization mode dispersion compensator.

US 6,560,014 to Trzecieski et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew T Sever whose telephone number is 703-305-4036. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell Adams can be reached on 703-308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

AS
July 16, 2003

RUSSELL ADAMS
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